REMARKS/ARGUMENTS

Applicants respond herein to the Office Action dated December 31, 2002. A Petition for Extension of Time (three months) and the fee therefor are enclosed.

Also enclosed is a Notice of Appeal to maintain the application and to prevent it from becoming automatically abandoned while this communication is being considered by the Examiner.

Claim 1, 20, 21, 25, 26 and 28 stand rejected on grounds of obviousness over Haque, et al. (4,598,022), in view of applicant's alleged admission. Claim 24 stands rejected on grounds of obviousness over Haque '022, in view of applicant's alleged admission, as applied to claims 1, 20, 21, 25, 26 and 28, as noted above, further in view of Haque (4,588,641). Claim 29 stands rejected on grounds of obviousness over Haque '022, as noted above, further in view of Kleeberg (5,089,290).

In addition, claims 1, 23-25, 28 and 29 stand provisionally rejected under the judicially created doctrine of obvousness-type double patenting as being unpatentable over claims in co-pending application no. 09/529,052. Reconsideration is requested in view of the amendments to the claims herein, the proposed Terminal Disclaimer, and the following remarks.

Preliminarily, note that the enclosed proposed Terminal Disclaimer is not signed, nor is the fee therefor enclosed. These requirements will be met when and if the co-pending application advances to issue. This should now obviate the provisional double patenting rejection of the obviousness type.

Preliminarily, the Applicants' undersigned representative notes the Examiner's courtesy during an interview with the Examiner on April 16, 2003 wherein the undersigned urged that the substrate 14 in the Haque '022 is not an electrode, which the Examiner indicated will be given due consideration when considering the formal written response.

Further, the Applicants note that the independent claim 1 has always recited the step of positioning the metal substrate to be treated as the "anode" itself. It is the Applicants' interpretation and understanding that, as such, the metal substrate is the anode electrode, which

renders the embodiment (in Example II of Haque '022) wherein a substrate is placed on an already existing anode as disclosed in this reference irrelevant.

However, in order to dispel the possibility of a different interpretation, each of the independent claims has now been amended to positively recite that the metal substrate is actually the anode electrode and that, as part of the claimed process, the metal substrate to be treated is introduced into the chamber and then directly and electrically connected to the positive terminal of the DC power supply.

Clearly, no such disclosure is provided in the primary Haque '022 reference. Indeed, Applicants would suggest that there is no basis in the disclosure in Haque '022 for the Office Action assertion that the placement of a substrate to be treated, as in Example II in Haque '022, to consider the substrate to have been transformed or rendered as an electrode, as such. Generally, it appears counterintuitive to form the product being worked, as one of the electrodes in a plasma chamber.

As will be explained below, the method of the invention produces unexpected and yet highly beneficial and unique results. The method of the invention can be stated to have the following main characteristic features. The first is the relationship between the metal substrate and the anode of the device. The second relates to the kind of gases being used and the ratio between polymer gas and non-polymerization gas.

Firstly, constituting the metal substrate as the anode of the system provides improvements in the aging properties, i.e., in the "durability" of the polymerized film and the adhesion property between the film being formed and the substrate on which it is formed. The latter aspects (the gases and their ratios) are related to the functional properties of the finally obtained polymerized film, vis-à-vis, its hydrophilicity or hydrophobicity.

With reference to Fig. 2 of the present application, it can be very clearly seen that the metal substrate to be treated (element 2) is directly connected to the positive terminal of the power supply 3. As a result of constituting the metal substrate to be treated as the anode electrode of the system, the polymer film can be reproduced with great repeatability and consistency. This produces a product that is homogenous from device to device as long as all of the other processing conditions and the process are kept virtually constant from metal substrate to

metal substrate. It has been the Applicants' experience that when the metal substrate to be treated is provided separately of the actual electrodes in the chamber as in the cited references, no matter how the metal is placed and regardless of whether the substrate is placed on one or the other of the electrodes, the polymer film is obtained with a varying and inconsistent quality, including because the contact resistance of the metal substrate and any electrode on which it is placed and the plasma configuration within the chamber vary as the polymerization process progresses, despite the fact that other process conditions are maintained the same.

That is, using the prior art including Haque '022, the polymers deposited at the anode and on the metal substrate and the cathode differ markedly as the process is repeated. The film being formed on the substrate is polymerized with chemical and physical properties that are different from those of the cathode, as the energy transfer mechanism of the anode and the cathode differs from each other.

As known, electrode bombardment takes place at the anode side while ion bombardment takes place at the cathode side. Consequently, the film polymerized at the anode side exhibits no aging effects and, depending on whether the property is either initially hydrophilic or hydrophobic, that property will be retained over the passage of time without loss of its physical characteristics. In addition, the polymer film that is formed with the method of the present invention contains far fewer defects and the adherence between the polymer film and the substrate is of excellent quality.

In contrast, the polymer film at the cathode side has a less compact structure than that at the anode, which produces poorer aging properties and durability qualities. The film polymerized at the cathode side contains many defects due to the strong particle energy and bombardment, such as the ion bombardment. These defects increase internal strength inside the film which deteriorates the adherence property of the film to the substrate.

In the Haque '022 reference (as well as in the Haque '641 reference), the substrate clearly does not constitute the electrode. Rather, it is simply positioned between two electrodes. Although the Examiner alleges that in Example II of the Haque '022 reference the substrate is placed on the anode, Applicants respectfully submit that it does not mean or require that the substrate constitute the anode itself as in the present invention. Haque '022 provides an electrode

18 on which the substrate is placed and that electrode is depicted as being connected to the negative terminal of the power supply.

As a result, the structure of the polymer produced according to the cited reference is not expected by the instant inventors to become as homogeneous and as reproducible as that obtained with the present invention. This is due to the arrangement of electrode and substrate, which is different from the present invention. Moreover, Haque '022 discloses at column 4, lines 33-35 that "an AC source is preferred because films deposited from DC glow discharge systems are generally poor and difficult to reproduce." That disclosure constitutes a teaching to one of ordinary skill in the art which militates against the use of DC power as in the present invention. Moreover, Example II in Haque '022 is simply intended to demonstrate the effect of laminate adhesion of different placements of the substrate relative to the organic species. The main technical feature related to the problem to be solved by Haque '022 (improving the laminate adhesion of substrates) in the example is that the substrate to be polymerized should be placed as close to the organic species as can be. See column 6, lines 1-16. In the example, the organic species is placed on the cathode plate and this is the reason why the substrate should desirably placed on the cathode plate in Haque '022. If the organic species were placed on the anode plate, the substrate will be placed on the anode, but this is not disclosed.

In summary, Haque '022 does not disclose the specific steps of the present invention nor the constitution wherein the substrate is formed as the anode. And indeed, this reference does not disclose the effect on the polymer that is obtained by different placements of the substrate, i.e. the anode relative to the other electrode, i.e. the cathode, as described in the present invention.

The present invention is further distinguishable from the cited references owing to the recitation of the use of particular reaction gases which are instrumental in imbuing the obtained polymerized film with specific hydrophilic or hydrophobic properties, depending on the type of gases and the ratio between the polymer and non-polymerization gas.

The gases used in the Haque '022 reference are poorer in nature, containing organic species selected from the group consisting of benzotriazole, toluenetriazole, acetyl, acetone, n-vinyl carbazole, 9-acetyl anthracene, and mixtures thereof, and at least one of nitrogen

and hydrogen. The "polar" nature of the gases in Haque '022 is closely related to the laminated adhesion property of the gases, as described at column 3, lines 46-48 of the cited reference.

In contrast, the gases used in the present invention, i.e. unsaturated aliphatic hydrocarbon monomer gas, such as C_2H_2 and non-polymerizable gas, are quite different from those of the cited reference, when the overall nature of the gases is considered as a whole.

Haque '022 discloses only that the gases are used to form a film having improved laminated adherence properties and is silent as to the relationship between the gases and the hydrophilic of hydrophobic properties of the obtained polymerized film. Although Haque '022 discloses at column 3, lines 42-52 that the nature of the formed polymer film will depend upon the type of organic species used and whether both nitrogen and hydrogen are used, this disclosure does not teach or suggest that the gases being used have any specific relationship and need to be regulated so as to control the hydrophilic or hydrophobic properties of the film.

Consequently, the cited reference does not disclose or suggest a specific kind of gases according to the present invention, i.e. "unsaturated aliphatic hydrocarbon monomer" gases, which are advantageously used with a non-polymerizing gas in forming hydrophilic or hydrophobic films.

A further aspect of the invention which is recited in various ones of the claims concerns the ratio of non-polymerizable gas to the reaction gas. As described in the specification of the present application, the ratio of non-polymerizable gas to the reaction gas is an important consideration that determines the property of the polymer film insofar as its hydrophilicity or hydrophobicity is concerned.

Haque '022 discloses only the ratio of N_2H_2 varying from 0.1:1 to 10:1 (but the purpose in controlling this ratio is not disclosed). Haque '022 is silent as to the ratio of the organic species to N_2 (or H_2).

In summary, the cited primary reference does not disclose the specifics of the recitation in the claims insofar as they specify the ratio of non-polymerizable gas to the reaction gas, which, as noted above, determines the hydrophilicity and hydrophobicity properties of the eventually obtained film.

The foregoing remarks are generally applicable to the independent claim of the application. The dependent claims include all of the limitations of the main claim and impose further limitations thereon which distances them even further from the prior art.

Accordingly, the Examiner is respectfully requested to reconsider the application, allow the claims amended and pass this case to issue.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 30, 2003:

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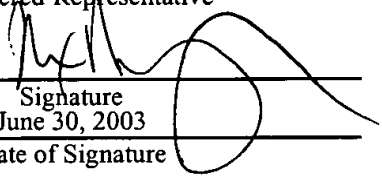
Name of applicant, assignee or Registered Representative



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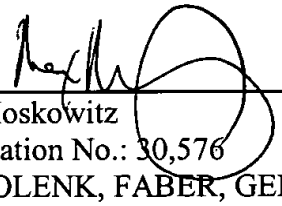
Respectfully submitted,



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